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1. Distribution Type Problem (presented by W. L. Smith)

$$X_1 + Y_1 + Z_1 \leq 90$$
$$X_2 + Y_2 + Z_2 = 70$$
$$X_3 + Y_3 + Z_3 = 50$$
$$X_4 + Y_4 + Z_4 = 60$$

$$X_1 + X_2 + X_3 + X_4 = 150$$
$$Y_1 + Y_2 + Y_3 + Y_4 = 40$$
$$Z_1 + Z_2 + Z_3 + Z_4 = 80$$

$$(5+22)X_1 + (10+13)X_2 + \cdots + (20+37)Z_4 = \text{min.}$$

LPG can handle 50 by 100 matrix
50 different conditions
100 variables
40 by 80 matrix requires 3 hours for processing

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FROM \ TO	1	2	3	4	
X					
Y					
Z					

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2. Reading on Simulation

pages 174 to 183
407 to 411

TOP MANAGEMENT DECISION SIMULATION:
THE AMA APPROACH

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ELEMENTARY MATHEMATICAL PROGRAMMING
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Indust Eng Dept
General Motors

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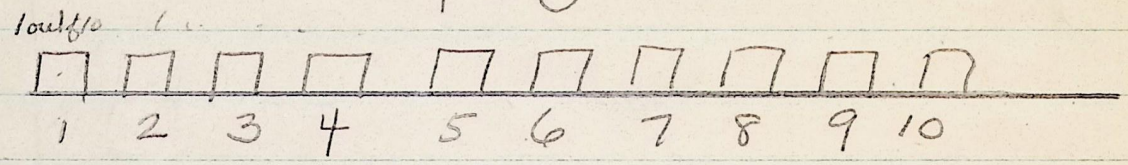
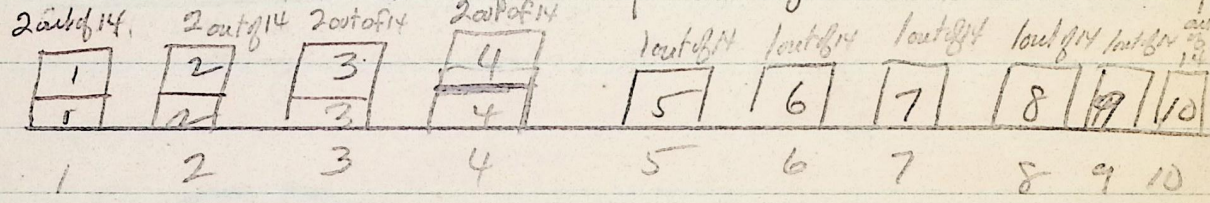
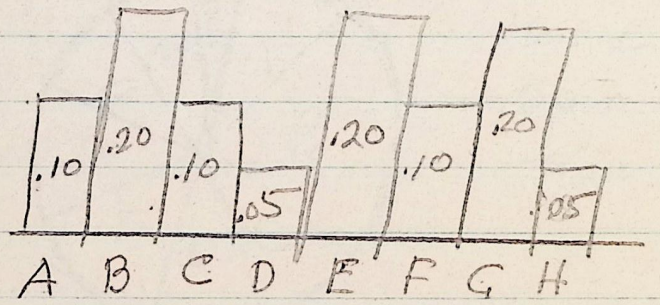
3. SIMULATION – MONTE CARLO METHOD – RANDOM WALK

a. Simulated Sampling



Random sampling (weighted).



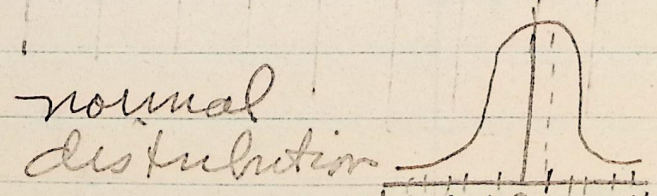


Use chips of Similar Mark.
.10 A
.20 B
.10 C
etc

.00 .09	10 29	30 39	40 44	45 64	65 74	75 94	95 99

← Take random sequence to choose sample

Such as
.35 = C
.87 = G
42 = D
06 = A
89 = G



normal distribution

Standard deviation

$$\frac{X - \bar{X}}{\sigma}$$

Practically everything in curve in 3 — almost certainly except within 4

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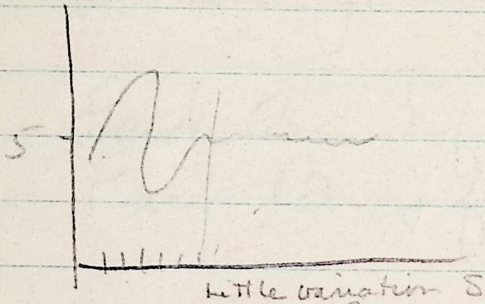
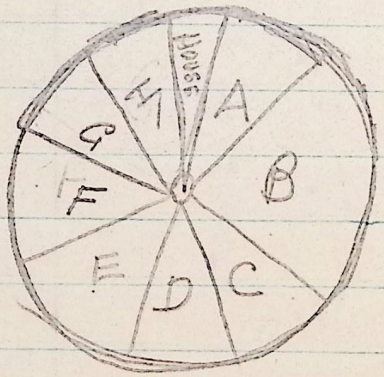
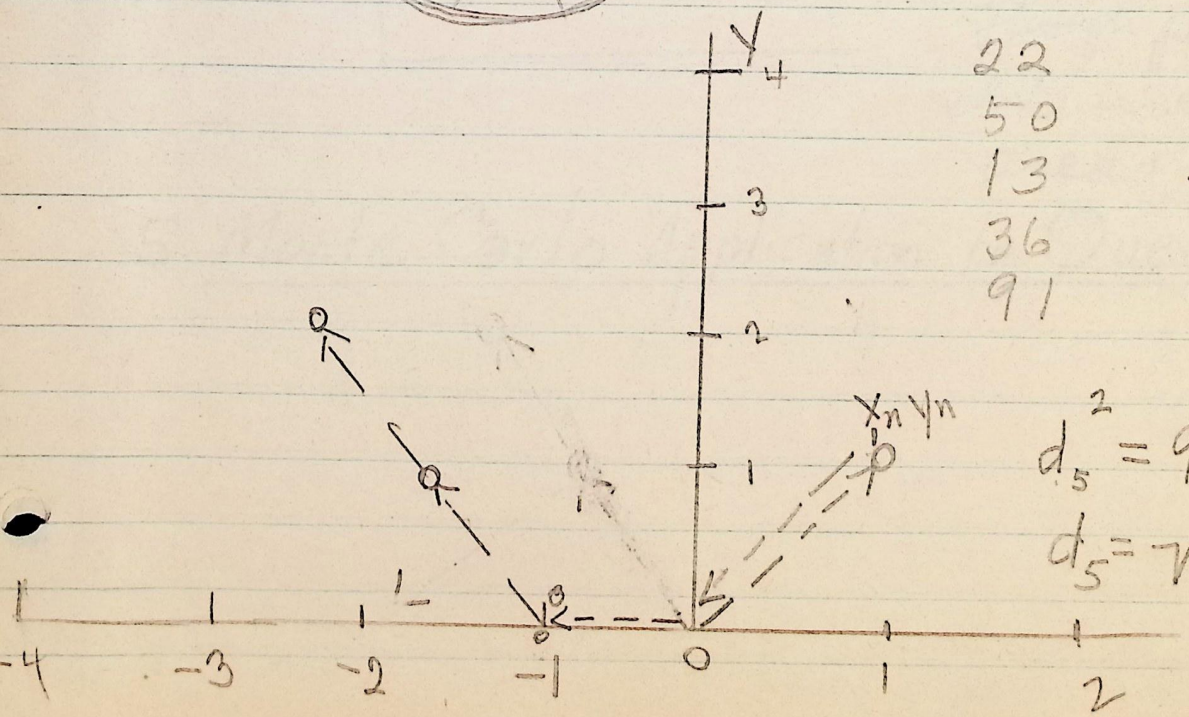
Number of samples.



Little variation shown
Enough samples probably



MONTE CARLO
Spin it.
This technique



	X_n	Y_n
22	1	1
50	0	0
13	-1	1
36		
91		

$d_5^2 = 9 + 1$

$d_5 = \sqrt{10} = 3.16$

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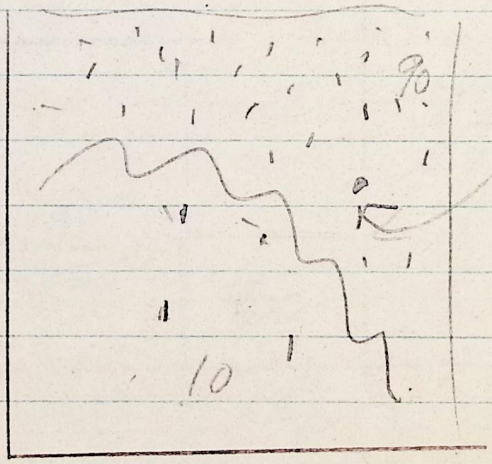
4. Life Curves

Simulate putting a large number of pieces.

Part A Life 16 hours
Part B Life 64 hours

{ which is shortest source life for assembly.

Difficult function to evaluate
Equation is fantastic to work out.



Start taking random sample points determine which area they fall in through percentage determine percentage of areas.

5. Monte Carlo Application to Queuing Models.

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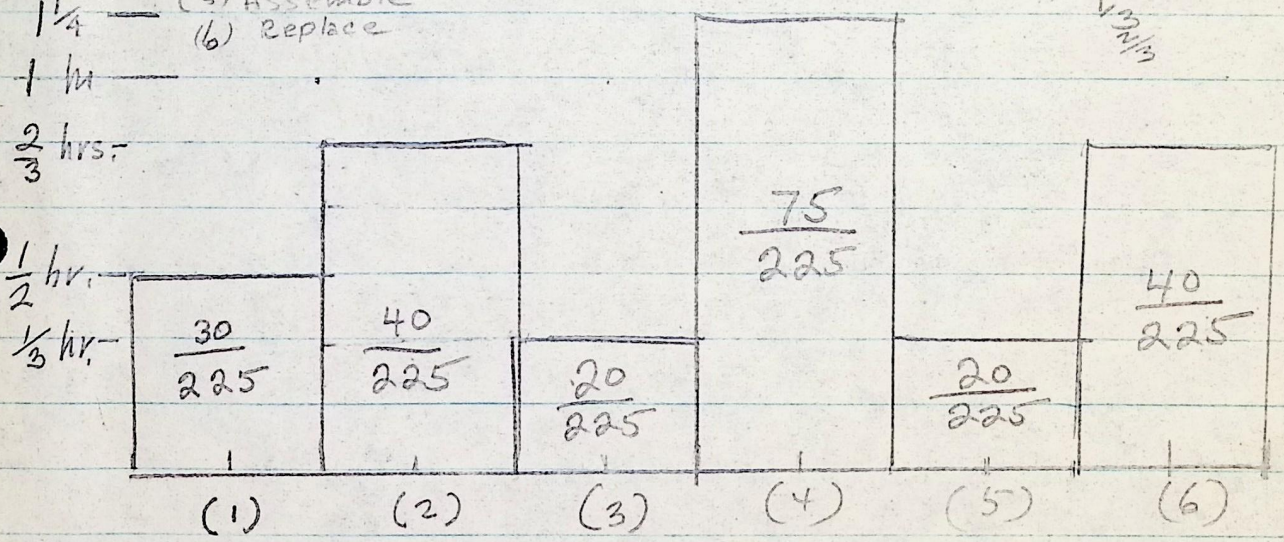
6. Problem (pumps)

a. Operation

(1) Shutdown
(2) Remove manifold
(3) Disassemble
(4) Overhaul
(5) Assemble
(6) Replace

Time (Hrs.)

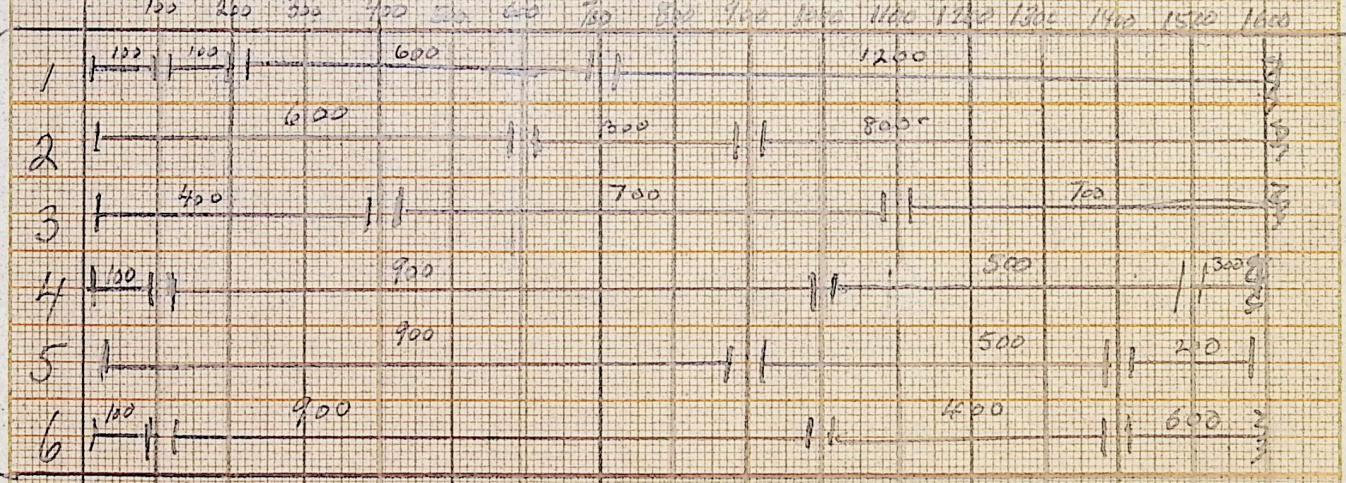
1/2	30
2/3	40
1/3	20
1 3/4	75
1/3	20
2 1/3	40
	225



00 – 29

30 – 69

INTAKE						EXHAUST					
1		2		3		4		5		6	
RN	L	RN	L	RN	L	RN	L	RN	L	RN	L
09	100	54	600	41	400	01	100	80	900	06	100
06	100	26	300	57	700	79	900	52	500	80	900
45	500	68	800	57	700	48	500	12	200	35	400
71	1200	87	1100	49	500	33	300	10	200	55	600



Policy I

Policy II

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